USER MANUAL

ETU02A-MUX

Standalone Series
2/4-Data Ports Multiplexer
Fractional E1 Access Unit
With Optional Sub-Link E1 Port

CTC union CTC Union Technologies Co.,Ltd.
ISO 9001

The information contained in this document is subject to change without prior notice.

TRADEMARKS

Microsoft is a registered trademark of Microsoft Corp.

HyperTerminal™ is a registered trademark of Hilgraeve Inc.

WARNING:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual may cause harmful interference in which case the user will be required to correct the interference at his own expense. NOTICE: (1) The changes or modifications not expressively approved by the party responsible for compliance could void the user's authority to operate the equipment. (2) Shielded interface cables and AC power cord, if any, must be used in order to comply with the emission limits.

CISPR PUB.22 Class A COMPLIANCE:

This device complies with EMC directive of the European Community and meets or exceeds the following technical standard. EN 55022 - Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment. This device complies with CISPR Class A.

WARNING:

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

CE NOTICE

Marking by the symbol CE indicates compliance of this equipment to the EMC directive of the European Community. Such marking is indicative that this equipment meets or exceeds the following technical standards: EN 55022:1994/A1:1995/A2:1997 Class A and EN61000-3-2:1995, EN61000-3-3:1995 and EN50082-1:1997

CTC Union Technologies Co., Ltd.
Vienna Technology Center
8F, No. 60, ZhouZi St.,
NeiHu, Taipei, 114
Taiwan

ETU02A-MUX 4 Port MUX, Fractional E1, Installation and Operation Manual
Version 1.1 Feb. 2005 Printing

This manual supports the following models:
ETU02A-MUX.2-XX-AC, 2 Port MUX, universal AC
ETU02A-MUX.4-XX-AC, 4 Port MUX, universal AC
ETU02A-MUX.2-XX-DC, 2 Port MUX, DC model
ETU02A-MUX.4-XX-DC, 4 Port MUX, DC model

TABLE OF CONTENTS

TABLE OF CONTENTS

CHAPTER 1. INTRODUCTION

1-1. INTRODUCTION

The ***ETU02A-MUX*** provides an economical data multiplexing solution for E1 and Fractional E1 network services. Depending upon the model, two or four DTE devices may be linked to an ***ETU02A-MUX*** at data rates of 56Kbps to 1984Kbps (framed mode). The ***ETU02A-MUX*** also provides one optional E1 sub-link (drop and insert). The E1 sub-link will perform Drop & Insert on connections from a PABX or other E1 equipment to E1 network services using user-defined timeslot.

The ***ETU02A-MUX*** supports local control and diagnostics via a console (craft) port connection (RS-232 Async). This feature enables users to easily configure the unit and execute the in-service diagnostics either locally or remotely (via modem connection).

1-2. FUNCTIONAL DESCRIPTION

The ***ETU02A-MUX*** data channels support user-selectable transmission rates, which are integer multiples of 56 or 64kbps, up to a maximum 1.984Mbps (CCS framing), for a line attenuation of up to -43 dB on twisted pair or coax cable. An integral LTU is included, providing an approximate operating range of up to 2km (using 22AWG).

The ***ETU02A-MUX*** packs the data channels into the E1 link in user-selected time slots, while the unused time slots may insert a user assigned IDLE code.

The ***ETU02A-MUX*** supports selection of three major data channel interfaces: RS-232(SYNC), V.35, and RS-530. Additionally, RS-449 and X.21 are supported via adapter cables attached to an RS-530 configured interface.

The ***ETU02A-MUX*** fully meets E1 specifications including ITU-T G.703, G.704, G.706, G.732, and G.823.

The ***ETU02A-MUX*** features diagnostic capabilities for performing local loop back and remote digital loop back. The operator at either end of the line may test both the ***ETU02A-MUX*** and the E1 link in the digital loop back mode. The loop back is controlled by menu selection on an ASCII terminal attached to the control (craft) port.

During loop back testing a number of internal pseudo random test patterns may be generated, according to ITU-T, for direct end-to-end integrity testing. The Error indicator flashes for each bit error detected.

Multiple clock source selection provides maximum flexibility in connecting both the E1 and user interfaces. The E1 link may be clocked from the E1 recovered receive clock (main E1 link or sub E1 link), from any one of the user data ports, or from the internal oscillator.

The ***ETU02A-MUX*** has following master timing modes:

- MAIN LINK: Timing is recovered from the main E1 link.
- SUB LINK: Timing is recovered from the E1 sub-link
- INT OSC: Timing is provided by the internal oscillator of the ***ETU02A-MUX***.
- CH1 LINK: Timing is recovered from the Data Channel 1.
- CH2 LINK: Timing is recovered from the Data Channel 2.
- CH3 LINK: Timing is recovered from the Data Channel 3.
- CH4 LINK: Timing is recovered from the Data Channel 4.

The ***ETU02A-MUX*** data channel interface supports three clocking modes:

- Mode 1 (DCE): DCE interface. The ***ETU02A-MUX*** provides the transmit and receive clocks to the user's equipment connected to the data channel.
- Mode 2 (DTE 1): DTE interface. The ***ETU02A-MUX*** data channel accepts the user transmit clock and provides a receive clock (Transparent timing) to the user's equipment connected to the data channel.
- Mode 4 (DTE 3): DTE interface. The ***ETU02A-MUX*** data channel accepts the user transmit and receive clock (All from ETC pin) provided by the equipment connected to the data channel.

The ***ETU02A-MUX*** operates from 90VAC ~ 250VAC. The unit is built in a single unit high, EIA compliant 19" rack mountable case, that may also be placed on desktops or shelves. DC model units are also available for 24 volts or -48 volts.

1-3. TYPICAL SYSTEM APPLICATIONS

General

In a typical application (Figure 1-1), the ***ETU02A-MUX*** could be used to connect the synchronous data channels of two host computers and the local and remote LANs over an E1 line. The following example is using the ***ETU02A-MUX.2*** two data port multiplexer.

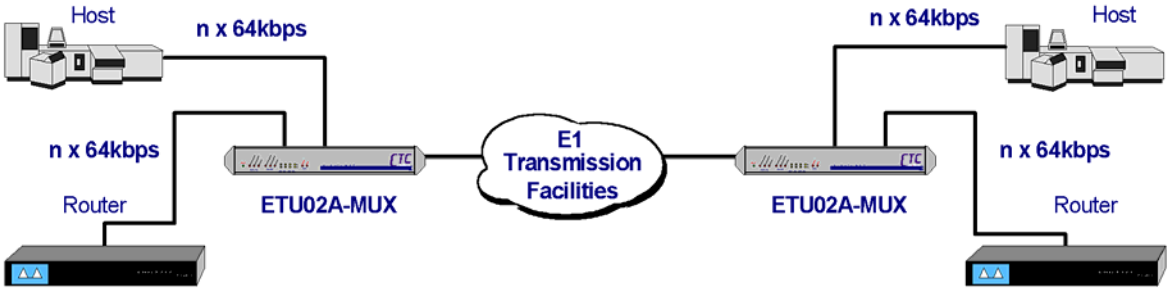


Figure 1-1: Example 1; Two Channel Typical Application

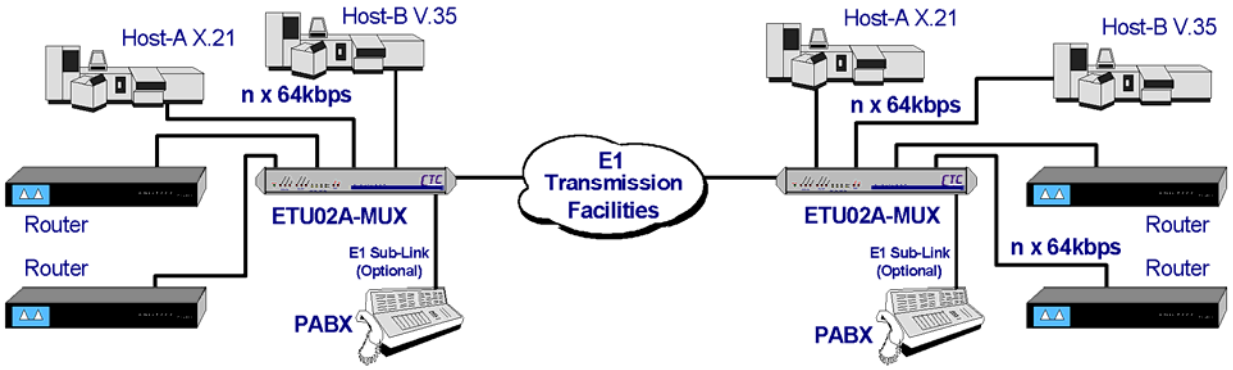


Figure 1-2: Example 2; Four Channel plus E1 Sub-Link Application

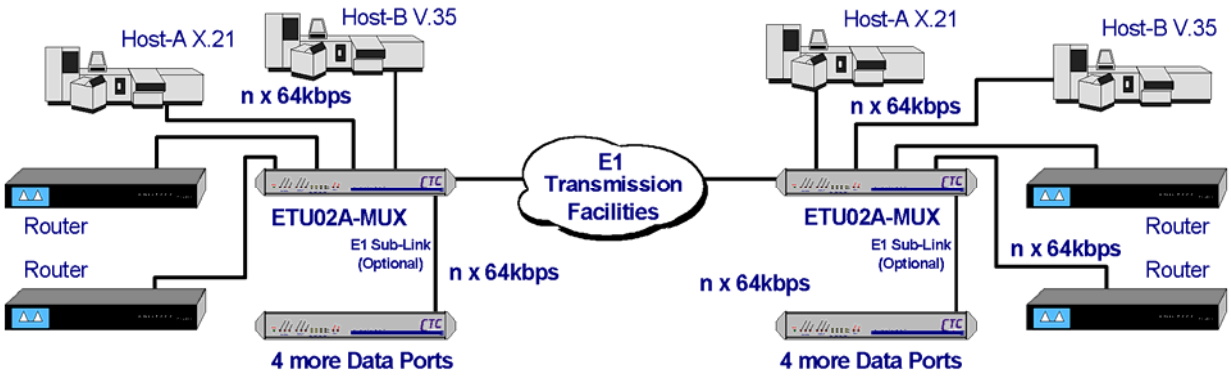


Figure 1-3: Example 3; Cascade ETU02A from E1 Sub-Link Application

The fractional E1 data service is based on the assumption that the combined user data rate of all channel modules plus Sub-Link is equal to or is a fraction of the full available E1 bandwidth, in multiples of 56K or 64K. Up to four data channels may be connected (***ETU02A-MUX.4***, two for the ***ETU02A-MUX.2***) plus an optional E1 sub-link.

1-4. E1 signal structure

The E1 line operates at a nominal rate of 2.048Mbps. The data transferred over the E1 line is organized into frames, with each E1 frame containing 256 bits. The 256 bits are organized as 32 time slots of eight bits each, that carry the data payload.

E1 transmissions utilize two main types of framing: **Frame Alignment Signal** (FAS) and **Multi-Frame Alignment Signal** (MFAS). Framing is necessary in order for equipment receiving the E1 signal to be able to identify and extract the individual channels. **PCM-30** (CAS) transmission systems use MFAS framing along with FAS framing. **PCM-31** (CCS) transmission systems use only FAS framing.

Frame Alignment Signal (FAS)

As previously mentioned, the 2.048 Mbps E1 frame consists of 32 individual time slots (numbered 0-31). Each time slot consists of an individual 64 Kbps channel of data. In the FAS format, time slot 0 of every other frame is reserved for the frame alignment signal pattern. Alternate frames contain the FAS Distant Alarm indication bit, SA bits and others bits reserved for national and international use. We refer to this frame mode as CCS or more commonly as PCM31, 31 timeslots are available for carrying data.

Multi-Frame Alignment Signal (MFAS)

MFAS framing uses **Channel Associated Signaling** (CAS) to transmit the A/B/C/D bits signaling information for each of 30 channels. This method uses the 32 time slot frame format with time slot 0 dedicated for the **Frame Alignment Signal** (FAS) and time slot 16 dedicated for the **Multi-Frame Alignment Signal** (MFAS) and the **Channel Associated Signaling** (CAS). We refer to this framing mode as CAS or more commonly PCM30, 30 timeslots are available for carrying data.

E1 line signal

The basic E1 line signal is coded using the **Alternate Mark Inversion** (AMI) or **HDB3** rule.

In the AMI format, “ones” are alternately transmitted as positive and negative pulse, whereas “zeros” are transmitted as a zero voltage level. AMI is not used in most 2.048 Mbps transmissions because synchronization loss occurs during long strings of data zeros.

In the HDB3 format, a string of four consecutive zeros is replaced with a substitute string of pulses containing an intentional bipolar violation. The HDB3 code substitutions provide high pulse density so that the receiving equipment is able to maintain synchronization with the received signal.

1-5. *ETU02A-MUX* Capabilities

E1 link line coding

The ***ETU02A-MUX*** supports two E1 line codes:
AMI coding.
HDB3 coding.

E1 framing formats

The ***ETU02A-MUX*** supports five formats:
Unframed format. (Data Port Ch.1 active only)
FAS (CCS, PCM-31) format.
FAS (CCS, PCM-31) plus CRC4 format.
MFAS (CAS, PCM-30) format.
MFAS (CAS, PCM-30) plus CRC4 format.

User data channel rates

The ***ETU02A-MUX*** supports user data channel rates which are a multiple of 56 or 64kbps. For maximum flexibility, the ***ETU02A-MUX*** supports data rates up to 1.984Mbps. (2.048Mbps unframed, data port channel 1 active only) The ***ETU02A-MUX*** supports flexible time slot assignment, allowing the user to freely specify the selection of time slots for each data channel sequentially or randomly.

User data channel interface

The ***ETU02A-MUX*** has three types of hardware configurable and software selectable user data channel interfaces that utilize common fixed DB25F connectors: RS-232(SYNC), V.35, and RS-530. The ***ETU02A-MUX*** also supports RS-449 and X.21 data channels via adapter cables attached to an RS-530 configured interface. The ***ETU02A-MUX.2*** supports two data channel port interfaces, while the ***ETU02A-MUX.4*** supports up to four data channel port interfaces.

1-6. TECHNICAL SPECIFICATIONS

Main link E1 and sub link E1

Framing	-Unframed/Framed (Sub E1 Framed ONLY!)
	-CCS (PCM31)/CAS (PCM30)
	-CRC4 ON/OFF
Bit Rate	2.048 Mbps
Line Code	-AMI
	-HDB3
Line Impedance	-Unbalanced 75 ohms
	-Balanced 120 ohms
Relative Receive Level	0 to -43dB
“Pulse” Amplitude	-Nominal 2.37V±10% for 75 ohms
	-Nominal 3.00V±10% for 120 ohms
“Zero” Amplitude	±0.1V
Transmit Frequency Tracking	
Internal Timing	±30 ppm
Loopback Timing	±50 ppm
External Timing	±100 ppm
Jitter Performance	According to ITU-T G.823
Complies With	ITU-T G.703, G.704, G.706 and G.732
Interface Connectors	-15-pin, D-type Female (balanced)
	-BNC (unbalanced)

User Data Channels

Interfaces Type	- V.35 - RS-232 (SYNC) - RS-530 (RS-449, X.21)
Interface Cable Connectors	
V.35 Interface	25 pin to 34 pin, Female cable
RS-232 Interface	25 pin, D-type Female
RS-530	25 pin, D-type Female
X.21 Interface	25 pin to 15 pin, D-type Female cable
RS-449 Interface	25 pin to 37 pin, D-type Female cable
Line Code	NRZ
Data Rate	N×56kbps or N×64kbps where N equal 1 to 31 in CCS or N equal 1 to 30 in CAS
Clock Modes	
Clock Mode 1 (DCE)	Receive and transmit clock (recovered) to the synchronous DTE
Clock Mode 2 (DTE1)	Receive clock to the synchronous, and transmit clock from the synchronous device. (transparent)
Clock Mode 4 (DTE3)	Receive and transmit clock from the synchronous DCE (all from the ETC pin).
Control Signals	-CTS constantly ON or follow RTS -DSR constantly ON, except during test loops -DCD constantly ON, except during signal loss
Time slot allocation	User defined

LED indicators

PWR	Green	Power
Signal Loss	Red	E1 link signal loss
Sync Loss	Red	E1 link sync loss
Alarm	Red	E1 link alarm, includes: BPV error / CRC4 error / Frame slip / Alarm Indication Signal (AIS) / Remote alarm (RAI)
Signal Loss	Red	Sub-E1 link signal loss
Sync Loss	Red	Sub-E1 link sync loss
Alarm	Red	Sub-E1 link alarm, includes: BPV error / CRC4 error / Frame slip / Alarm Indication Signal (AIS) / Remote alarm (RAI)
CH1~CH4	Yellow	RD/TD activity indicators for Data Channels
Test Error	Red	Bit errors
Test	Red	Unit in Loop back or BERT test active

Diagnostic tests

Test loops	-Main link local analog loop back -Main link local digital loop back -Main link remote loop back -Sub link local analog loop back -Sub link local digital loop back -Sub link remote loop back -User's channel (1-4) local digital loop back -User's channel (1-4) local analog loop back -User's channel (1-4) remote loop back
BERT test pattern	-511 -2047 -2^15-1 -2^20-1 -QRSS -2^23-1 -All ones -All zeros -ALT -Double ALT (11001100….) -3 in 24 -1 in 16 -1 in 8 -1 in 4

RS-232/Alarm (craft) port

Port interface	V.24 / RS-232 asynchronous
Port connector	9 pin D-type female
Data rate	2400, 4800, 9600, or 19200 baud
Data format	-One start bit -8 data bits -No parity -One stop bit
Alarm relay	-Floating pair of NO and NC contacts -Contact ratings: 1A at 30 VDC resistive or 0.5A at 125 VAC resistive

(NC contacts open on loss of power or loss of signal on main E1 or Sub E1.)

Physical

Height:	45 mm
Width:	430 mm
Depth:	235 mm
Weight:	2.75 kg

Power supply

Voltage	90 ~ 250 VAC, +24VDC, or -48VDC
Frequency	47 to 63 Hz for AC power
Power consumption	15 Watts
Fuse	0.5A slow blow for VAC

Environment

Temperature	0-50C / 32-122F
Humidity	0 to 90% non-condensing

This page left blank intentionally.

2-1. GENERAL

This chapter provides detailed instructions for mechanical installation of the ***ETU02A-MUX***. Following the completion of installation, please refer to Chapter 3 for console port operating information.

2-2. SITE PREPARATION

Install the ***ETU02A-MUX*** within reach of an easily accessible grounded AC outlet. The outlet should be capable of furnishing 90 to 250 VAC. Allow at least 10cm (4 inch) clearance at the rear of the ***ETU02A-MUX*** for signal lines and interface cables.

2-3. MECHANICAL ASSEMBLY

The ***ETU02A-MUX*** is designed for tabletop, shelf or rack mount installation, and except for rack mount installation, is delivered completely assembled. Rack mounted applications require installation of additional rack mounting "ears". No provisions are made for bolting the ***ETU02A-MUX*** to the tabletop.

2-4. ELECTRICAL INSTALLATION

2-4-1. Power connection

AC power is supplied to the ***ETU02A-MUX*** through a standard IEC 3-prong plug. (Refer to Figure 2-1) The ***ETU02A-MUX*** should always be grounded through the protective earth lead of the power cable.

The line fuse is in an integral-type fuse holder with the IEC power connector located on the rear panel. Make sure that only fuses of the required rating are used for replacement. Do not use repaired fuses or short-circuit the fuse holder. Always disconnect the power cable before removing or replacing the fuse.

2-4-2. Rear panel connectors

The data port channel interfaces (DCE) are accessible from the rear panel of the ***ETU02A-MUX*** (Refer to Figure 2-1) and consist of DB25pin Female connectors. Direct connections are allowed for RS-232 (SYNC) and RS-530. Adapter cables are required for V.35, RS-449, and X.21. The E1 line and E1 sub-link connectors incorporate one DB15pin each or two pairs of BNC Coax connectors. (Appendix B provides detailed information on the various interface connectors).

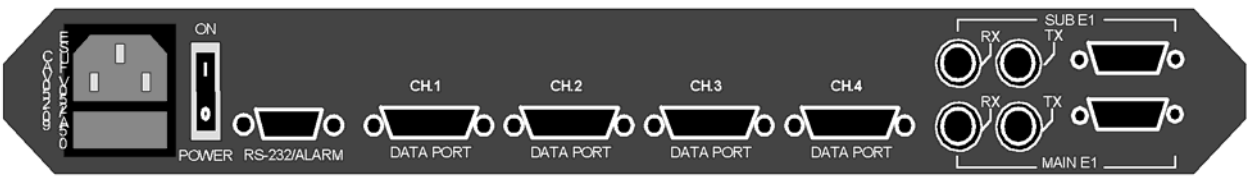


Figure 2-1 ***ETU02A-MUX*** rear panel

E1 Line side

DB-15 Connector (Balanced 120 ohm)

The pin assignments for DB-15 connector are as follows:

Pin:	Function:
1	TTIP (Transmit data out)
9	TRING (Transmit data out)
3	RTIP (Receive data in)
11	RRING (Receive data in)

BNC coax connector (Unbalanced 75 ohm)

Two BNC coax connectors marked RX and TX (Same function as the E1 line DB15 connector).

Data channel Interfaces

All data port interfaces utilize a pin-out based upon a standard DSUB-25F connector. Software control, hardware strapping and adapter cables provide the appropriate connects for V.35, RS-449 and X.21. RS232 and RS-530 may connect directly to the ***ETU02A-MUX***. Please refer to the interface pin out and adapter cable specifications in the appendix.

Cable and Termination

Use a shielded twisted pair cable between the ***ETU02A-MUX*** and the DTE device. The receivers on the ***ETU02A-MUX*** are 100 Ohm terminated (For X.21 and RS-530). If problems are encountered with the connection to the DTE interface, make sure that the ***ETU02A-MUX*** and DTE interface are terminated correctly.

2-5. DIP Switch Setting and Interface Termination Strapping

2-5-1. Caution

To avoid accidental electric shot, disconnect the ***ETU02A-MUX*** power cord before opening the cover. Access inside the equipment is only permitted to authorized and qualified service personnel.

2-5-2. Procedure

a. Turn power OFF. Disconnect the power cord from the AC outlet.
b. Loosen the captive thumb screws on the left and right sides of the rear panel.
c. Slide the outer housing forward to reveal the main PCB.
d. Adjust the DIP switches as required, according to table 2-1.
e. Add or remove the interface terminating resistors according to table 2-2.
f. Slide the PCB assembly back into the outer housing and tighten the thumb screws.
g. Perform any necessary interface configuration via the terminal control port.

Table 2-1

Item	Function	Possible Settings	Switch Designation		Factory Setting
1	Craft port Speed	On / Off	DSW1-1	DSW1-2	Off/Off
	9600		OFF	OFF	
	2400		OFF	ON	
	19200		ON	OFF	
	4800		ON	ON	
2	Reserved	On / Off	DSW1- 2		Off
3	Reserved	On / Off	DSW1- 3		Off
4	Reserved	On / Off	DSW1- 4		Off
5	Interface Setup	On / Off	DSW1- 5		Off
7	Main E1 Impedance	All On=75Ω, All Off=120Ω	DSW2- 1~5		All Off
8	Sub E1 Impedance	All On=75Ω, All Off=120Ω	SW1- 1~5*		All Off
9	Frame ground	DIS: Not Connected to signal ground CON: Connected to signal ground	CHASS1		DIS

DSW1 and DSW2 are located on the main PC Board.

*Switch SW1 is located on the optional Sub E1 Interface card.

Table 2-2

Port	Interface Type	Possible Settings	Resistor Designation	Setting	Factory Setting
1	V.35	Present / Absent	RP18, 19, 21	All Present	✓
	RS232	Present / Absent	RP18, 19, 21	All Absent	
	RS-530	Present / Absent	RP18, 19, 21	RP21 Only	
2	V.35	Present / Absent	RP16, 17, 20	All Present	✓
	RS232	Present / Absent	RP16, 17, 20	All Absent	
	RS-530	Present / Absent	RP16, 17, 20	RP20 Only	
3	V.35	Present / Absent	RP15, 14, 23	All Present	✓
	RS232	Present / Absent	RP15, 14, 23	All Absent	
	RS-530	Present / Absent	RP15, 14, 23	RP23 Only	
4	V.35	Present / Absent	RP12, 13, 22	All Present	✓
	RS232	Present / Absent	RP12, 13, 22	All Absent	
	RS-530	Present / Absent	RP12, 13, 22	RP22 Only	

Note: For RS-449 and X.21, please use the RS-530 settings.

Resistor pack values:

RP18, RP16, RP15 and RP12 (5 pin) 300 ohm
RP19, RP17, RP14 and RP13 (9 pin) 560 ohm
RP21, RP20, RP23 and RP22 (8 pin) 180 ohm

IMPORTANT: When replacing resistor packs, take extreme care to align the pins in the sockets and to orient the "DOT" on the pack with the "square" on the PCB silkscreening for proper termination.

2-6. Interface Software Configuration

Preparing the proper interface cables and strapping the appropriate termination resistor packs according to Table 2-2 will complete the hardware setup of the interface ports. For proper operation, however, the board firmware must be made aware of the changes. This special procedure, using a terminal attached to the local control serial port, need only be performed during initial installation and/or configuration of the ETU-02A. Please familiarize yourself with the connection and operation procedures for the Control Port operation in Chapter 3. Once you are comfortable with the terminal port operation, proceed to configure the data channel interface ports as follows.

1. With the unit powered off and main PCB exposed, set DIP DSW1 switch 5, ON.
2. Replace PCB, connect terminal to control port and apply power.
3. From the main menu select item "2", **Define System Parameter**.
4. From the **Define System Parameter** menu, select item "5", **Data Port**.
5. From the **Define Data Port Parameter** menu, select a port for configuration, "1 thru 4".
6. Select item "6", **Interface**, from the menu. (This item not displayed if DSW1-5 not ON)
7. Select item "1" for RS-232, item "2" for V.35, or item "3" for RS-530/449 or X.21.
8. Press "ESC" and select another port for configuration. Follow the same procedure.
9. After completing the interface configuration for each port, press "ESC" until the top menu.
10. Select item "5" to exit terminal mode.
11. Power off the ETU-02A, open the case, set DSW1-5 OFF, and close the case.

Configuration of the channel ports interface is now complete.

3-1. General

The ***ETU02A-MUX*** Control Port (labeled RS-232/Alarm on the rear panel) is an RS-232 asynchronous console terminal port designed to facilitate setup of all parameters through the use of a standard text based terminal or any terminal emulation program running on a Personal Computer.

3-2. Terminal Connection

A notebook computer has become an invaluable tool of the Systems Engineer. Connection to the computer is straight forward. The only other hardware required is a DB9-pin one-to-one, male to female cable. The ***ETU02A-MUX*** acts as a DCE to the PC's DTE communications port. A convenient application, provided with the Microsoft Windows 9X operating systems, is "HyperTerminal ™". Set the properties to match the ***ETU02A-MUX*** control port factory defaults as follows: Baud=9600, Data bits=8, Parity=None, Stop bits=1, and handshaking=none. Make the appropriate connections, start the terminal application, apply power to the ***ETU02A-MUX***, then press SPACE or ENTER on the PC keyboard. If you are using "HyperTerminal ™" the display should look like the following.

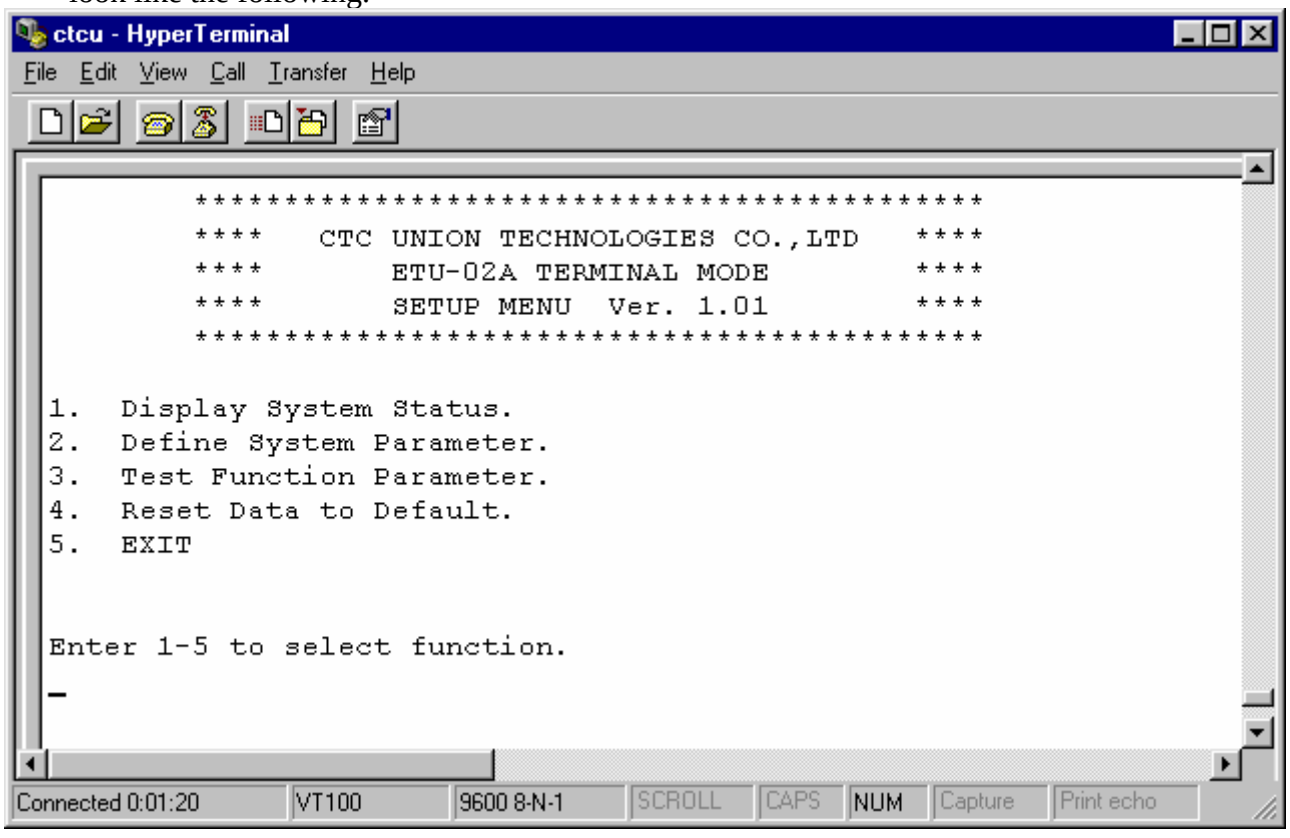


Figure 3-1. Example of terminal display

3-3. Menu System Detail

The following section will detail actual displays with descriptions of parameter settings via relevant key commands.

This is the first screen seen after connecting. Note that the first two items, "Display" and "Define" deal with all the system settings. The "Display" item will give a quick overview of all settings, while under "Define", all parameters may be both viewed and changed.

```
        ******************************************
        ****                                  ****
        ****       ETU-02A TERMINAL MODE      ****
        ****       SETUP MENU  Ver. 1.01      ****
        ******************************************

1.  Display System Status.
2.  Define System Parameter.
3.  Test Function Parameter.
4.  Reset Data to Default.
5.  EXIT

Enter 1-5 to select function.
```

Enter 1 to enter the Display System Status menu.

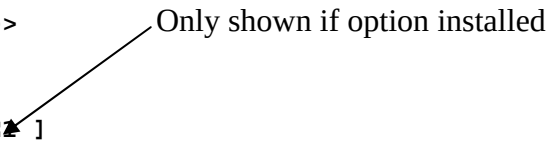
```
        <<  Display System Status  >>

Timing : < Internal OSC >

              [ Main E1 ]     [ Sub E1 ]
Frame :         CCS             CCS
CRC4 :          Disable         Disable
Idle Code :     7E              7E
RAI :           Disable         Disable
Line Code :     HDB3            HDB3
Impedance :     75 ohm          75 ohm

          [ Time Slot Mapping ]
SLOT :  00      01      02      03      04      05      06      07
TYPE :  Fr      c1      c1      c2      c2      .       .       .
SLOT :  08      09      10      11      12      13      14      15
TYPE :  .       .       .       .       .       .       .       .
SLOT :  16      17      18      19      20      21      22      23
TYPE :  .       .       .       .       .       .       .       .
SLOT :  24      25      26      27      28      29      30      31
TYPE :  .       .       .       .       .       .       .       .

Enter "SPACE" to next page or "ESC" to previous menu.
```



Press "Space" again to display the second page.

Only shown on 4 port model

```
              [ Channel 1 ]  [ Channel 2 ]  [ Channel 3 ]  [ Channel 4 ]
Clock Mode:      DCE            DCE            DCE            DCE
Multiplier:      Nx64           Nx64           Nx64           Nx64
CTS        :      ON             ON             ON             ON
Tx Clock   :     Normal         Normal         Normal         Normal
Rx Clock   :     Normal         Normal         Normal         Normal
Interface  :     V.35           V.35           V.35           V.35
Speed      :     128Kbps        128Kbps          NC             NC

Enter "SPACE" to next page or "ESC" to previous menu.
```

Press the "ESC" key to return to the top menu.

```
        ******************************************
        ****                                  ****
        ****       ETU-02A TERMINAL MODE      ****
        ****       SETUP MENU  Ver. 1.01      ****
        ******************************************

1.  Display System Status.
2.  Define System Parameter.
3.  Test Function Parameter.
4.  Reset Data to Default.
5.  EXIT


Enter 1-5 to select function.
```

Select menu item "2" to set the system parameters for the ETU02A.

```
        <<  Define System Parameter  >>

1.  Timing     < Main Link >
2.  Main Link
3.  Sub Link    [ N/A ]
4.  Time Slot
5.  Data Port

Enter 1-5 or Press "ESC" to previous menu.
```

Shows "N/A" if option not installed

Enter "1" to set the timing source for the ETU02A. The screen will split horizontally with the available timing parameter settings displayed on the lower half screen.

```
<<  Define System Parameter  >>

1.  Timing     < Main Link >
2.  Main Link
3.  Sub Link   [ N/A ]
4.  Time Slot
5.  Data Port

Enter 1-5 or Press "ESC" to previous menu.
-------------------------------------------------------------------
Timing :
1.  Main Link
2.  Sub Link  [ N/A ]
3.  Internal OSC
4.  Channel 1
5.  Channel 2
6.  Channel 3
7.  Channel 4

Enter 1-7 or Press "ESC" to previous menu.
```

The available clock settings are:

1- Recovery timing from the main E1 link received signal.

2- Recovery timing from the sub E1 link received signal (if option installed).

3- Clock source set from the ETU02A's internal crystal oscillator.

4- Clock source from the DTE attached to channel 1 data port.

5- Clock source from the DTE attached to channel 2 data port.

6- Clock source from the DTE attached to channel 3 data port.

7- Clock source from the DTE attached to channel 4 data port.

The default setting is Main Link recovery.

To set the timing source from the internal oscillator press "3". The screen will revert to the System Parameter page. Note that the timing is now from "Internal OSC" (see arrow).

```
        <<  Define System Parameter  >>

1.  Timing     < Internal OSC >   <----------
2.  Main Link
3.  Sub Link   [ N/A ]
4.  Time Slot
5.  Data Port

Enter 1-5 or Press "ESC" to previous menu.
```

To set the parameters for the main E1 link such a frame mode, CRC-4, idle code, line code, and remote alarm indication, press "2".

```
        <<  Define Main Link Parameter  >>

1.  FRAME      < CCS >
2.  CRC-4      < Disable >
3.  IDLE CODE  < 7E >
4.  RAI        < Disable >
5.  LINE CODE  < HDB3 >

Enter 1-5 or Press "ESC" to previous menu.
```

Enter "1" to set the frame mode for the ETU02A. The screen will split horizontally with the available frame mode parameter settings displayed on the lower half screen.

```
        <<  Define Main Link Parameter  >>

1.  FRAME      < CCS >
2.  CRC-4      < Disable >
3.  IDLE CODE  < 7E >
4.  RAI        < Disable >
5.  LINE CODE  < HDB3 >

Enter 1-5 or Press "ESC" to previous menu.
--------------------------------------------------------------------------
Frame :

1.  CCS
2.  CAS
3.  UNFRAME

Enter 1-3 or Press "ESC" to previous menu.
```

To set the frame mode to CAS (PCM30), enter "2".

```
        <<  Define Main Link Parameter  >>

1.  FRAME      < CAS >   <----------
2.  CRC-4      < Disable >
3.  IDLE CODE  < 7E >
4.  RAI        < Disable >
5.  LINE CODE  < HDB3 >

Enter 1-5 or Press "ESC" to previous menu.
```

The Main Link parameter page will again be displayed and the frame mode will reflect the change (see arrow).

Press "2" to select the CRC-4 parameter. The screen will again split with the parameters "enable" or "disable" shown on the bottom half of the screen.

```
        <<  Define Main Link Parameter  >>

1.  FRAME       < CAS >
2.  CRC-4       < Disable >
3.  IDLE CODE   < 7E >
4.  RAI         < Disable >
5.  LINE CODE   < HDB3 >

Enter 1-5 or Press "ESC" to previous menu.
------------------------------------------------------------------------
CRC-4 :

1.  Disable
2.  Enable

Enter 1-2 or Press "ESC" to previous menu.
```

To enable the CRC-4 setting, press "2". The screen will again revert to the Main Link parameter page and the CRC-4 setting will be reflected in the display (see arrow).

```
<<  Define Main Link Parameter  >>

1.  FRAME       < CAS >
2.  CRC-4       < Enable >  <----
3.  IDLE CODE   < 7E >
4.  RAI         < Disable >
5.  LINE CODE   < HDB3 >

Enter 1-5 or Press "ESC" to previous menu.
```

Follow the same procedure to set the idle code (00 to FF hex), to enable or disable RAI, or to set the line code between AMI or HDB3. When finished with the Main Link settings, press "ESC" to return to the System Parameter menu.

```
        <<  Define System Parameter  >>

1.  Timing      < Internal OSC >
2.  Main Link
3.  Sub Link    [ N/A ]
4.  Time Slot
5.  Data Port

Enter 1-5 or Press "ESC" to previous menu.
```

Follow the same procedure to set the parameters for the Sub E1 link, if the option is installed.

From the Define System Parameter page, press "4" to enter the Time Slot setting page.

```
        <<  Define Time Slot Parameter  >>

SLOT :  00      01      02      03      04      05      06      07
TYPE :  Fr      c1      c1      c2      c2      .       .       .

SLOT :  08      09      10      11      12      13      14      15
TYPE :  .       .       .       .       .       .       .       .

SLOT :  16      17      18      19      20      21      22      23
TYPE :  Si      .       .       .       .       .       .       .

SLOT :  24      25      26      27      28      29      30      31
TYPE :  .       .       .       .       .       .       .       .
-------------------------------------------------------------------
  [ Time Slot ] ---> 1
```

Setting Time Slot # 1

```
0.  Not Defined
1.  Channel 1        3.  Channel 3        5.  Sub E1 Data
2.  Channel 2        4.  Channel 4        6.  Sub E1 Voice

Enter 0-6 or Press "ENTER" to next Time Slot or "ESC" to previous menu.
```

The Time Slot mapping display shows the assignments for all of the 32 timeslots of the E1 frame. All timeslots 0~31 are shown with the assigned "Type" abbreviations directly beneath. Time slot assignment is not available in Unframed mode. In Unframed mode, all 32 time slots are assigned to the Channel 1 data port for a throughput of 2048Kbps on that port only. In CCS (PCM31) framing mode, time slot zero is reserved for FAS (frame alignment signal) and will display the abbreviation "Fr". When CAS (PCM30) framing is selected, both time slot zero and time slot sixteen are reserved. Time slot sixteen is reserved for CAS (channel associated signaling) and MFAS (multi-frame alignment signal) and will display the abbreviation "Si". The remaining time slots may be assigned to "c1", "c2", "c3", "c4", or to the optional Sub E1 as data "sd" or voice "sv" ("c3" and "c4" are not available in the 2-port model, Sub E1 is optional). Unassigned time slots will display a period ".". To select the next time slot for setting, press "Enter". To return to the Define System Parameters menu, enter "ESC".

```
<<  Define System Parameter  >>

1.  Timing     < Internal OSC >
2.  Main Link
3.  Sub Link   [ N/A ]
4.  Time Slot
5.  Data Port

Enter 1-5 or Press "ESC" to previous menu.
```

To define the Data Port parameter settings for each data port channel, enter "5".

```
        <<  Define Data Port Parameter  >>

                [ Channel 1 ]  [ Channel 2 ]  [ Channel 3 ]  [ Channel 4 ]
  Clock Mode:     DCE            DCE            DCE            DCE
  Multiplier:     Nx64           Nx64           Nx64           Nx64
  CTS       :      ON             ON             ON             ON
  Tx Clock  :     Normal         Normal         Normal         Normal
  Rx Clock  :     Normal         Normal         Normal         Normal
  Interface :     V.35           V.35           V.35           V.35
  Speed     :     128Kbps        128Kbps          NC             NC

Enter 1-4 or Press "ESC" to previous menu.
```

All of the above parameters with the exception of "Interface" and "Speed" may be modified through this menu. The "Interface" is set following a special procedure outlined earlier in Chapter 2. Installation (see 2-6). The "Speed" is a direct reflection of the time slot assignments and the multiplier. Enter "1" to modify the parameters for channel 1.

```
        <<  Define Data Port Parameter  >>

                [ Channel 1 ]  [ Channel 2 ]  [ Channel 3 ]  [ Channel 4 ]
  Clock Mode:     DCE            DCE            DCE            DCE
  Multiplier:     Nx64           Nx64           Nx64           Nx64
  CTS       :      ON             ON             ON             ON
  Tx Clock  :     Normal         Normal         Normal         Normal
  Rx Clock  :     Normal         Normal         Normal         Normal
  Interface :     V.35           V.35           V.35           V.35
  Speed     :     128Kbps        128Kbps          NC             NC

--------------------------------------------------------------------------------
       [ Channel 1 ]  <-------- Ready to modify data port no. 1
1. Clock Mode
2. Multiplier
3. CTS
4. Tx Clock
5. Rx Clock

Enter 1-5 or Press "ESC" to previous menu.
```

To change the clock mode of the Data port, enter "1".

```
        <<  Define Data Port Parameter  >>

                [ Channel 1 ]  [ Channel 2 ]  [ Channel 3 ]  [ Channel 4 ]
  Clock Mode:     DCE            DCE            DCE            DCE
  Multiplier:     Nx64           Nx64           Nx64           Nx64
  CTS       :      ON             ON             ON             ON
  Tx Clock  :     Normal         Normal         Normal         Normal
  Rx Clock  :     Normal         Normal         Normal         Normal
  Interface :     V.35           V.35           V.35           V.35
  Speed     :     128Kbps        128Kbps          NC             NC

--------------------------------------------------------------------------------
       [ Channel 1 ]
Clock Mode :

1. DCE (Recovery)
2. DTE1 (Transparent)
3. DTE3 (External)

Enter 1-3 or Press "ESC" to previous menu.
```

To change the data multiplier of the Data port, enter "2".

```
        <<  Define Data Port Parameter  >>

                [ Channel 1 ]  [ Channel 2 ]  [ Channel 3 ]  [ Channel 4 ]
  Clock Mode:     DCE            DCE            DCE            DCE
  Multiplier:     Nx64           Nx64           Nx64           Nx64
  CTS       :      ON             ON             ON             ON
  Tx Clock  :     Normal         Normal         Normal         Normal
  Rx Clock  :     Normal         Normal         Normal         Normal
  Interface :     V.35           V.35           V.35           V.35
  Speed     :     128Kbps        128Kbps          NC             NC

--------------------------------------------------------------------------------
       [ Channel 1 ]
Multiplier :

1. Nx64
2. Nx56


Enter 1-2 or Press "ESC" to previous menu.
```

Follow the same procedure to set the handshaking (CTS) and the transmit and receive clock polarity. Use the "ESC" key to return to the Define Port Parameter page and continue settings for the remaining data port channels. When finished return to the top menu level.

```
        ******************************************
        ****                                  ****
        ****       ETU-02A TERMINAL MODE      ****
        ****       SETUP MENU  Ver. 1.01      ****
        ******************************************

1.  Display System Status.
2.  Define System Parameter.
3.  Test Function Parameter.
4.  Reset Data to Default.
5.  EXIT


Enter 1-5 to select function.
```

From the main display press "3" to select the Test Function Parameters.

```
        <<  Define Test Mode Function  >>

1.  LoopBack Test
2.  BERT Test


Enter 1-2 or Press "ESC" to previous menu.
```

Under the "LoopBack" menu, the various modes of loop back may be set for the E1 link, data ports, or Sub E1. Under the "BERT" menu, the internal pattern generator may be enabled, various patterns selected, and point of signal insertion chosen. Enter "1" to setup the "LoopBack Test".

```
        <<  Define LoopBack Test Port  >>

1.  Main Link       < OFF >
2.  Sub Link        < OFF >
3.  Channel 1       < OFF >
4.  Channel 2       < OFF >
5.  Channel 3       < OFF >
6.  Channel 4       < OFF >
7.  All LoopBack OFF

Enter 1-7 or Press "ESC" to previous menu.
```

Refer to Chapter 4. Test and Diagnostics, for a detailed description of each of the available Loop Back modes. Press "ESC" to return to the Define Test Mode Function menu.

```
        <<  Define Test Mode Function  >>

1.  LoopBack Test
2.  BERT Test

Enter 1-2 or Press "ESC" to previous menu.
```

Enter "2" to setup the BERT test function.

```
        <<  BERT Test Parameter  >>

1.  Function       < Disable >
2.  Channel        < Channel 1 >
3.  Pattern        < 511 >
4.  Error Insert   < NONE >

Enter 1-4 or Press "ESC" to previous menu.
```

Enter "1" to enable or disable the BERT test function.

```
        <<  BERT Test Parameter  >>

1.  Function       < Disable >
2.  Channel        < Channel 1 >
3.  Pattern        < 511 >
4.  Error Insert   < NONE >

------------------------------------------------------------------------
Function :

1.  Disable
2.  Enable

Enter 1-2 or Press "ESC" to previous menu.
```

Press "2" to enable BERT and then press "ESC" and "2" to set the test signal insertion point.

```
        <<  BERT Test Parameter  >>

1.  Function       < Enable >
2.  Channel        < Channel 1 >
3.  Pattern        < 511 >
4.  Error Insert   < NONE >

------------------------------------------------------------------------
Channel :

1.  Channel 1
2.  Channel 2
3.  Channel 3
4.  Channel 4
5.  Main E1
6.  Sub E1

Enter 1-6 or Press "ESC" to previous menu.
```

Refer to Chapter 4. Test and Diagnostics, for a detailed description of each of the BERT test features.. Press "ESC" until return to the top main menu.

```
        ******************************************
        ****                                  ****
        ****       ETU-02A TERMINAL MODE      ****
        ****       SETUP MENU  Ver. 1.01      ****
        ******************************************

1.  Display System Status.
2.  Define System Parameter.
3.  Test Function Parameter.
4.  Reset Data to Default.
5.  EXIT

Enter 1-5 to select function.
```

To "Reset" the ETU-02A to factory defaults or restore normal operation following mis-settings, press "4" from the main menu.

```
        ******************************************
        ****                                  ****
        ****       ETU-02A TERMINAL MODE      ****
        ****       SETUP MENU  Ver. 1.01      ****
        ******************************************

1.  Display System Status.
2.  Define System Parameter.
3.  Test Function Parameter.
4.  Reset Data to Default.
5.  EXIT

Press "ENTER" to confirm, "ESC" to previous menu.
```

Pressing "Enter", will completely reset the unit to the factory defaults. No further warnings will be given, so use this function carefully. All timing, E1, Sub E1 and channel parameters must then be re-configured.

To terminate operation of the console port utility, from the main menu press "5". The following message will be displayed:

```
ETU-02A TERMINAL MODE IS DISCONNECTED
```

This completes the detailed examples of terminal mode operation for the *ETU02A-MUX*.

4-1. GENERAL

The ***ETU02A-MUX*** diagnostics functions include:

Status LED indicators.

User activated loop back.

Integrated Bit Error Rate Test (BERT).

The loop back tests are activated via the console terminal menu. The ***ETU02A-MUX*** also offers bit error rate testing (BERT) on both the synchronous data channel or the E1 main and sub link, using a locally generated and user selectable pseudo-random sequence. To provide compatibility with other BERT equipment, you may select from 14 different pseudo-random patterns.

4-2. STATUS INDICATORS

Indicators:

The status of the ***ETU02A-MUX*** is indicated by viewing the Signal Loss, Sync Loss, Alarm, Error and Test LED indicators. User data channel activity is indicated by the corresponding RD and TD LED indicators.

Table 4-1 LED indicators

Indicator	Color	Function
PWR	Green	ON when power is on.
Signal Loss	Red	ON when received signal is lost.(main E1 & sub E1)
Sync Loss	Red	ON when received frame sync is lost.(main E1 & sub E1)
Alarm	Red	ON when main E1 or sub E1 has an alarm. (Includes: BPV (Bipolar Violation) error / CRC4 error / Frame slip / AIS / Remote alarm)
RD	Yellow	ON when SPACE is being received.(CH1,CH2,CH3,CH4) Off when MARK is being received. Flashing when data is received. (Received by the DTE)
TD	Yellow	ON when SPACE is being transmitted (CH1,CH2,CH3,CH4) Flashing when data is transmitted. (Transmitted by the DTE)
Error	Red	ON when BERT function is activated and detects bit errors.
Test	Red	ON when the ***ETU02A-MUX*** is in any loop back mode or BERT function is on. Flashing when in remote loop back mode.

4-3. USER activated loopback.

The ***ETU02A-MUX*** supports the following types of test loop backs.

Main E1 local analog loop back.

Main E1 local digital loop back.

Main E1 remote loop back.

Sub E1 local analog loop back.

Sub E1 local digital loop back.

Sub E1 remote loop back.

Channel 1-4 local analog loop back.

Channel 1-4 local digital loop back.

Channel 1-4 remote loop back

The user activated loop back functions are accessed from the Define LoopBack Test Port menu. Refer to Chapter 3 for local control operations. The available loop back functions are described in the following paragraphs.

Main E1 local analog loop back

The Main E1 local analog loop back is performed by connecting the main link transmit signal to the input of the receive path in analog mode, as shown in Figure 4-1. This returns the transmit signal of each port on the receive path of the same port. Each channel (including sub link) must receive its own transmission. This loop back fully tests the local ***ETU02A-MUX*** operation and the connections to the local DTE. During this loop back, the ***ETU02A-MUX*** main link sends an unframed "all ones" signal to the remote equipment.

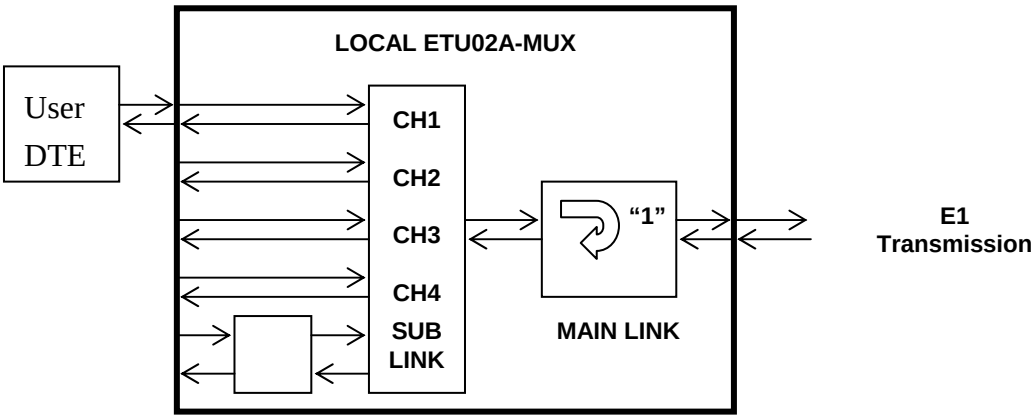


Figure 4-1. Main E1 local analog loop back

Main E1 local digital loop back

Main E1 local digital loop back is performed by connecting the main link receive signal to the output of the transmit path in the digital mode. This loop back test checks the performance of the local ***ETU02A-MUX***, the remote ***ETU02A-MUX*** and the connections between them, as shown in Figure 4-2.

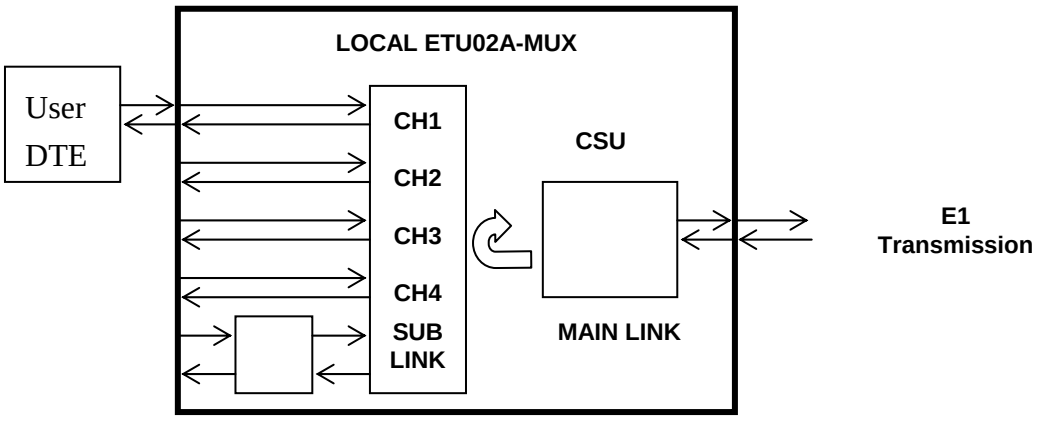


Figure 4-2. Main E1 local digital loop back

Main E1 remote loop back

Main E1 remote loop back is performed by sending the remote loop back code to the remote CSU/DSU. The remote then enters digital loop back mode and the link is returned to the local unit. This loop back test checks the performance of the local ***ETU02A-MUX***, the remote unit and the connections between them, as shown in Figure 4-3.

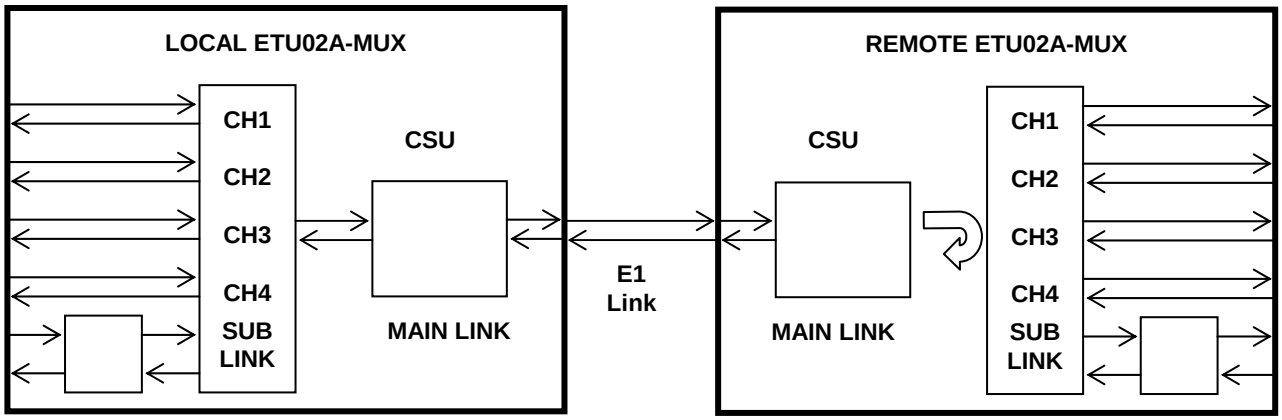


Figure 4-3. Main E1 remote loop back

Sub E1 local digital loop back

Sub E1 local digital loop back is performed by connecting the sub link receive signal to the output of the transmit path in digital mode, as shown in Figure 4-4. This loop back test checks the connection to the equipment connected to the local sub link. The test signal is provided by the equipment connected to the local sub link.

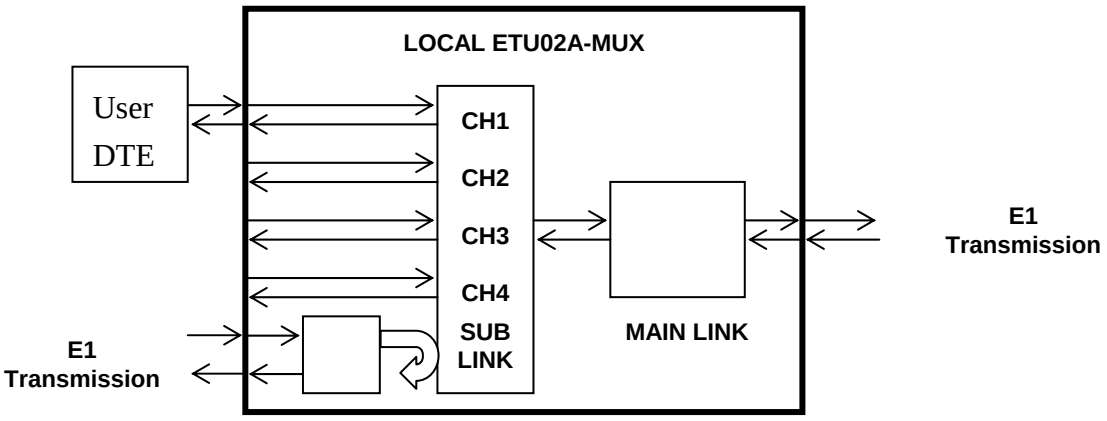


Figure 4-4. Sub E1 local digital loop back

Sub E1 local analog loop back

Sub E1 local analog loop back is performed by connecting the sub link transmit signal to the input of the receive path in analog mode, as shown in Figure 4-5. The test signal is provided by the equipment connected to the remote sub link. During this loop back, the ***ETU02A-MUX*** sub link sends an unframed "all ones" signal to the equipment connected to the local sub link.

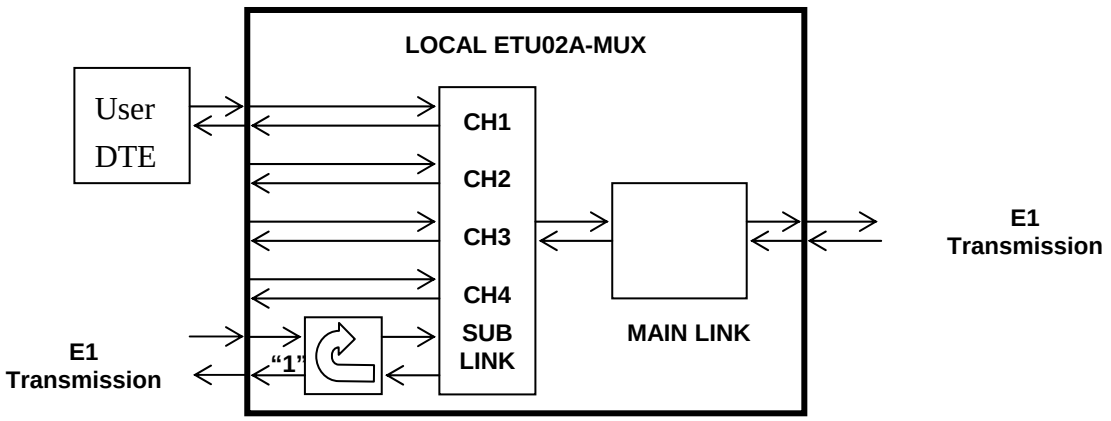


Figure 4-5. Sub link remote analog loop back

Sub E1 remote loop back

Sub E1 remote loop back is performed by sending the remote loop back code to the remote CSU/DSU. The remote then enters digital loop back mode on the sub E1 and the link is returned to the local unit. This loop back test checks the performance of the local ***ETU02A-MUX***, the remote unit and the connections between them, as shown in Figure 4-6.

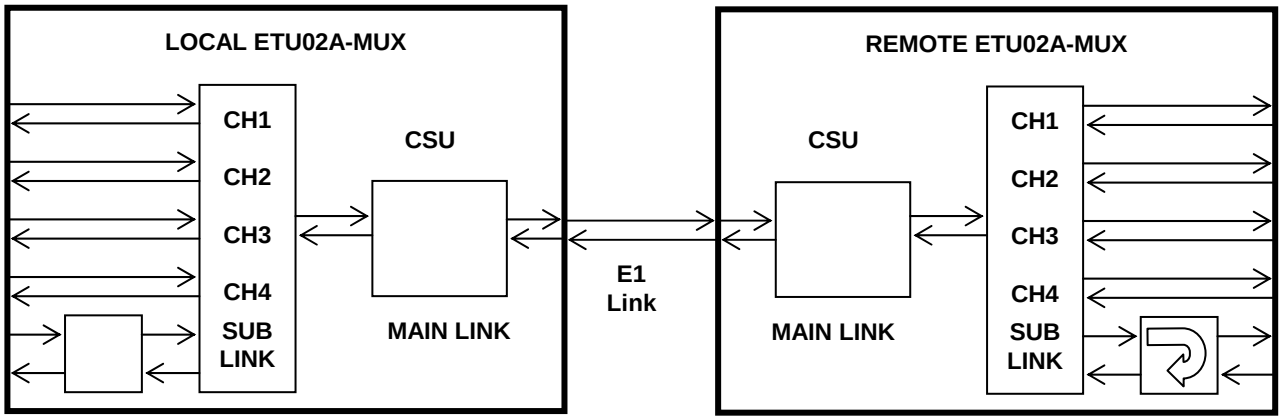


Figure 4-6. Sub E1 remote loop back

Channel 1-4 local analog loop back.

Channel local analog loop back is performed by connecting the data channel transmit data (TD) to the input of the receive path (RD) in analog mode, as shown in Figure 4-7. The test signal is provided by the local DTE.

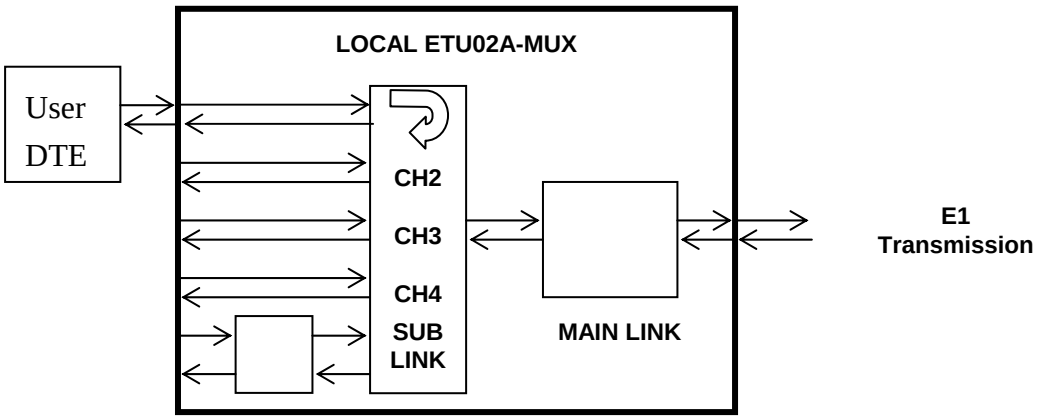


Figure 4-7. Channel local analog loop back

Channel 1-4 local digital loop back.

Channel local digital loop back is performed by connecting the local data channel receive data (RD) to the data channel transmit input (TD) in the digital mode, as shown in Figure 4-8. The test signal is provided by the remote user DTE.

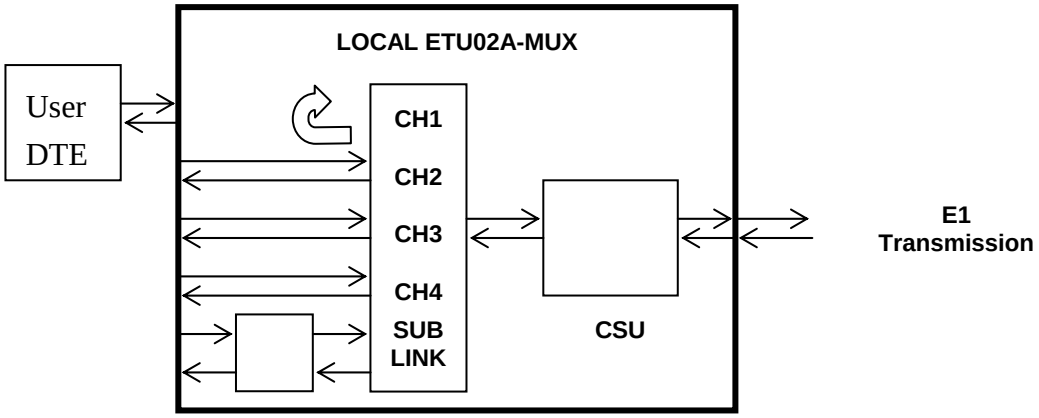


Figure 4-8. Channel local digital loop back

Channel 1-4 remote loop back

Channel 1-4 remote loop back is performed by sending the remote loop back code to the remote CSU/DSU. The remote then enters digital loop back mode on the selected channel and the link is returned to the local unit. The test signal is provided by the local user DTE. This loop back test checks the performance of the local ***ETU02A-MUX*** and connection to the DTE, the remote unit and the connections between them, as shown in Figure 4-9.

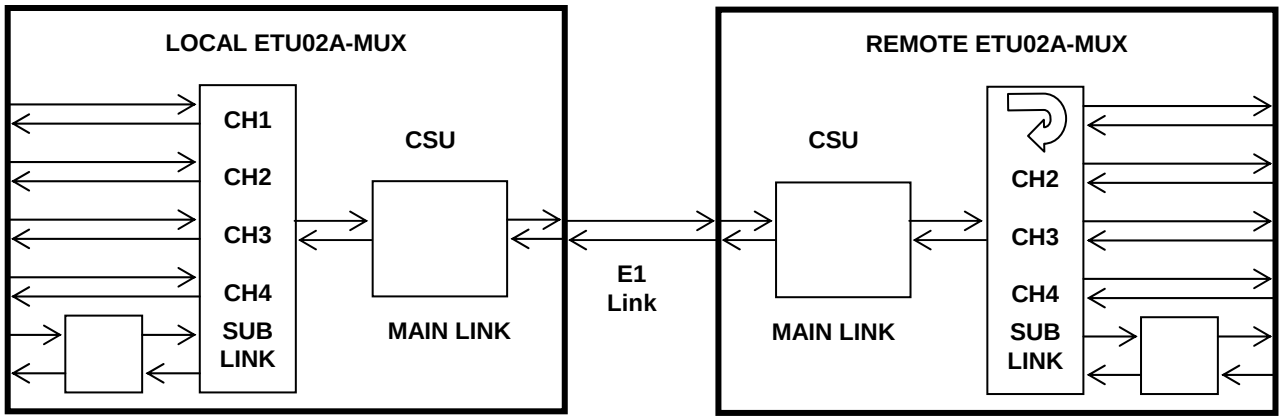


Figure 4-9. Channel 1-4 remote loop back

Integrated Bit Error Rate Test (BERT).

BERT testing may be performed on only one channel at a time. During the test, the local DTE is disconnected and the DSR line is off. An internal pattern generator connects a user selected test sequence to the transmit input of the local data channel interface. To calibrate the system, the user can inject errors at a selectable rate. The receive output is connected to a pattern tester. The tester compares the received and transmitted patterns and detects errors.

For a **local test**, use the main link local analog loop back (or hardwire main link RX connector to TX), to return the data back to the local DTE, as shown in Figure 4-10.

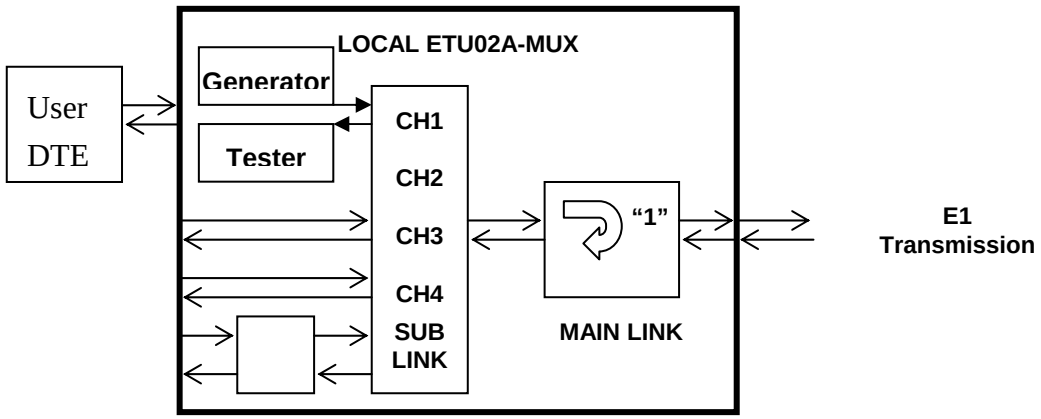


Figure 4-10. BERT for local test

(BERT on Channel 1, Main Link analog loop back.)

For a **system test**, use the remote loop back function or on the remote side use the main link digital loop back, or data channel remote loop back, to return the data back to the local DTE, as shown in Figure 4-11. Alternatively, run the BERT function from both sides using the same pattern type.

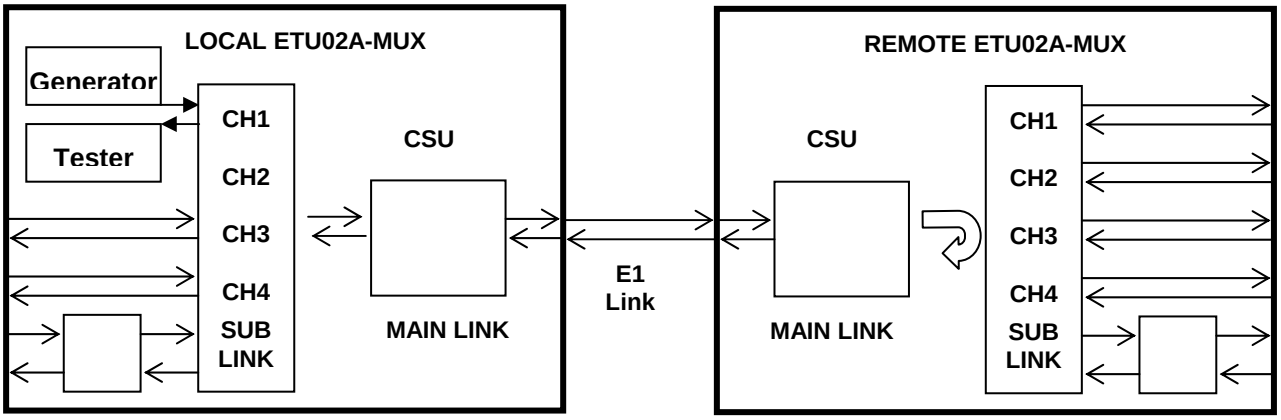


Figure 4-11. BERT used for system test

This page left blank intentionally.

A-1 DSW1 SETTING

DSW1		STATE		FUNCTION	CONDITION
-1	-2	OFF	OFF	Control Port 9600 Baud	factory set
		OFF	ON	Control Port 2400 Baud	
		ON	ON	Control Port 4800 Baud	
		ON	OFF	Control Port 19200 Baud	
-3		OFF		Reserved	factory set
		ON		Reserved	
-4		OFF		Reserved	factory set
		ON		Reserved	
-5		OFF		normal operation	
		ON		interface port configuration	

DSW1 is located on the main PC board.

A-2 SW1 SUB E1 LINE IMPEDANCE SETTING

DSW2	STATE	FUNCTION	CONDITION
ALL	OFF	120 ohm balanced	Factory setting
	ON	75 ohm unbalanced	

SW1 is located on the optional Sub Link interface card.

A-3 DSW2 MAIN E1 LINE IMPEDANCE SETTING

SW1	STATE	FUNCTION	CONDITION
ALL	OFF	120 ohm balanced	Factory setting
	ON	75 ohm unbalanced	

DSW2 are located on the main PC board.

A-4 JUMPER CHASS1 FRAME GROUND SETTING

CHASS1	STATE	FUNCTION	CONDITION
ALL	DIS	Frame ground not connected to signal	Factory setting
	CON	Frame ground connected to signal ground	

CHASS1 is located on the main PC board.

APPENDIX A. DIP SWITCH SETTING

This page left blank intentionally.

B-1. E1 LINE CONNECTORS

B-1.1 D-15 connector

The E1 link D-15 connector conforms to AT&T Pub 62411. The physical interface is a 15-pin female D-type connector.

Pin	Designation	Direction	Function
1	TTIP	From ***ETU02A-MUX***	Transmit data
2	FG	↔	Frame ground
3	RTIP	To ***ETU02A-MUX***	Receive data
4	FG	↔	Frame ground
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	TRING	From ***ETU02A-MUX***	Transmit data
10	--	--	--
11	RRING	To ***ETU02A-MUX***	Receive data
12	--	--	--
13	--	--	--
14	--	--	--
15	--	--	--

Table B-1 E1 D-15 connector pin allocation

B-1.2 BNC connector

Conn.	Pin	Designation	Direction	Function
TX	Center	TTIP	From ***ETU02A-MUX***	Transmit data
	Sleeve	TRING	↔	Signal return
RX	Center	RTIP	To ***ETU02A-MUX***	Receive data
	Sleeve	RRING	↔	Signal return

Table B-2 E1 BNC connector pin allocation

B-2. V.35 USER DATA CHANNEL CONNECTOR

Unless otherwise specified when ordering, the ***ETU02A-MUX*** data ports are all factory configured for V.35 interface. When connecting the DB25 to MB34 adapter cable, the physical interface is a 34-pin M-block type female connector wired in accordance with Table B-3.

SIGNAL FUNCTION	PIN mux	PIN V.35	CIRCUIT	DIR.	DESCRIPTION
Protective Ground	1	A	Frame	↔	Chassis ground. May be isolated from signal ground.
Signal Ground	7	B	Signal Ground	↔	Common signal ground.
TD	2 14	P S	TD(A) TD(B)	To ***MUX***	Serial digital data from DTE.
RD	3 16	R T	RD(A) RD(B)	Fm ***MUX***	Serial digital data at the output of the ***MUX*** receiver.
RTS	4	C	RTS	To ***MUX***	An ON signal to the ***MUX*** when data transmission is desired.
CTS	5	D	CTS	Fm ***MUX***	Constantly ON.
DSR	6	E	DSR	Fm ***MUX***	Constantly ON, except during test loops.
DTR	20	H	DTR	To ***MUX***	Not used.
DCD	8	F	DCD	Fm ***MUX***	Constantly ON, except when a loss of the received carrier signal is detected.
ETC	24 11	U W	ETC(A) ETC(B)	To ***MUX***	A transmitted data rate clock input from the data source.
Transmit Clock	15 12	Y AA	TC(A) TC(B)	Fm ***MUX***	A transmitted data rate clock for use by an external data source.
Receive Clock	17 9	V X	RC(A) RC(B)	Fm ***MUX***	A received data rate clock for use by an external data source.
External Receive clock	? ?	Z BB	ERC(A) ERC(B)	To ***MUX***	A received serial data rate clock input from the DTE.
Test Indicator	25	KK	TM	Fm ***MUX***	ON during any test mode

Table B-3. V.35 user data channel connector pin allocation

B-3. RS-530 USER DATA CHANNEL CONNECTOR

When the ***ETU02A-MUX*** is configured with an RS-530 interface, the physical interface is a 25-pin female D-type connector wired in accordance with Table B-4.

SIGNAL FUNCTION	PIN	CIRCUIT	DIRECTION	DESCRIPTION
Protective Ground	1	Frame	↔	Chassis ground. May be isolated from signal ground.
Signal Ground	7	AB	↔	Common signal ground.
Transmitted Data	2 14	BA(A) BA(B)	To ***MUX***	Serial digital data from DTE.
Received Data	3 16	BB(A) BB(B)	Fm ***MUX***	Serial digital data at the output of the ***ETU02A-MUX*** receiver.
Request to Sent	4 19	CA(A) CA(B)	To ***MUX***	A ON signal to the ***ETU02A-MUX*** when data transmission is desired.
Clear to Sent	5 13	CB(A) CB(B)	Fm ***MUX***	Constantly ON.
Data Set Ready	6 22	CC(A) CC(B)	Fm ***MUX***	Constantly ON, Except during test loops.
Data Terminal Ready	20 23	CD(A) CD(B)	To ***MUX***	DTR not used, used for a received serial data rate clock input from the DTE.
Data Carrier Detect	8 10	CF(A) CF(B)	Fm ***MUX***	Constantly ON, except when a loss of the received carrier signal is detected.
External Transmit clock	24 11	DA(A) DA(B)	To ***MUX***	A transmitted data rate clock input from the data source.
Transmit Clock	15 12	DB(A) DB(B)	Fm ***MUX***	A transmitted data rate clock for use by an external data source.
Receive Clock	17 9	DD(A) DD(B)	Fm ***MUX***	A received data rate clock for use by an external data source.
Test Indicator	25	TM	Fm ***MUX***	ON during any test mode

Table B-4. RS-530 user data channel connector pin allocation

B-4. RS-232 USER DATA CHANNEL CONNECTOR

When the ***ETU02A-MUX*** is configured with an RS-232 interface, the physical interface is a 25-pin female D-type connector wired in accordance with Table B-5.

SIGNAL FUNCTION	PIN	CIRCUIT	DIRECTION	DESCRIPTION
Protective Ground	1	AA	↔	Chassis ground. May be isolated from signal ground.
Signal Ground	7	AB	↔	Common signal ground.
Transmitted Data	2	BA	To ***MUX***	Serial digital data from DTE.
Received Data	3	BB	Fm ***MUX***	Serial digital data at the output of the ***ETU02A-MUX*** receiver.
Request to Sent	4	CA	To ***MUX***	An ON signal to the ***ETU02A-MUX*** when data transmission is desired.
Clear to Sent	5	CB	Fm ***MUX***	Constantly ON.
Data Set Ready	6	CC	Fm ***MUX***	Constantly ON, Except during test loops.
Data Terminal Ready	20	CD	To ***MUX***	DTR not used, used for a received serial data rate clock input from the DTE.
Data Carrier Detect	8	CF	Fm ***MUX***	Constantly ON, except when a loss of the received carrier signal is detected.
External Transmit clock	24	DA	To ***MUX***	A transmitted data rate clock input from the data source.
Transmit Clock	15	DB	Fm ***MUX***	A transmitted data rate clock for use by an external data source.
Receive Clock	17	DD	Fm ***MUX***	A received data rate clock for use by an external data source.
Test Indicator	25	TM	Fm ***MUX***	ON during any test mode

Table B-5. RS-232 user data channel connector pin allocation

B-5. RS-530 to RS-449 ADAPTER CABLE

When the ***ETU02A-MUX*** is to be connected to an RS-449 device, the interface is configured for RS-530 and an adapter cable is used. When connecting the DB25 to DB37 adapter cable, the physical interface is a 37-pin male D-type connector wired in accordance with Table B-6.

SIGNAL FUNCTION	RS-530 PIN	RS-449 PIN	RS-449 CIRCUIT	DESCRIPTION
Protective Ground	1	1	Frame	Chassis ground. May be isolated from signal ground.
Signal Ground	7	19,20, 37	SG,RC, SC	Common signal ground.
Transmitted Data	2 14	4 22	SD(A) SD(B)	Serial digital data from DTE.
Received Data	3 16	6 24	RD(A) RD(B)	Serial digital data at the output of the ***ETU02A-MUX*** receiver.
Request to Sent	4 19	7 25	RS(A) RS(B)	A ON signal to the ***ETU02A-MUX*** when data transmission is desired.
Clear to Sent	5 13	9 27	CS(A) CS(B)	Constantly ON.
Data Set Ready	6 22	11 29	DM(A) DM(B)	Constantly ON, Except during test loops.
Data Terminal Ready	20 23	12 30	TR(A) TR(B)	DTR not used, used for a received serial data rate clock input from the DTE.
Data Carrier Detect	8 10	13 31	RR(A) RR(B)	Constantly ON, except when a loss of the received carrier signal is detected.
External Transmit clock	24 11	17 35	TT(A) TT(B)	A transmitted data rate clock input from the data source.
Transmit Clock	15 12	5 23	ST(A) ST(B)	A transmitted data rate clock for use by an external data source.
Receive Clock	17 9	8 26	RT(A) RT(B)	A received data rate clock for use by an external data source.
Test Indicator	25	18	TM	ON during any test mode

Table B-6. RS-530 to RS-449 pin allocation

B-6. RS-530 to X.21 ADAPTER CABLE

When the ***ETU02A-MUX*** is to be connected to an X.21 device, the interface is configured for RS-530 and an adapter cable is used. When connecting the DB25 to DB15 adapter cable, the physical interface is a 15-pin female D-type connector wired in accordance with Table B-7.

SIGNAL FUNCTION	RS-530 PIN	X.21 PIN	RS-449 CIRCUIT	DESCRIPTION
Protective Ground	1	1	Shield	Chassis ground. May be isolated from signal ground.
Signal Ground	7	8	G	Common signal ground.
Transmitted Data	2 14	2 9	T(A) T(B)	Serial digital data from DTE.
Received Data	3 16	4 11	R(A) R(B)	Serial digital data at the output of the ***ETU02A-MUX*** receiver.
Request to Sent	4 19	3 10	C(A) C(B)	A ON signal to the ***ETU02A-MUX*** when data transmission is desired.
Data Carrier Detect	8 10	5 12	I(A) I(B)	Constantly ON, except when a loss of the received carrier signal is detected.
External Transmit clock	24 11	7 14	B(A) B(B)	A serial data rate clock input from the data source.
Signal Timing	15 12	6 13	ST(A) ST(B)	A transmitted data rate clock for use by an external data source.
Receive Clock	17 9	8 26	RT(A) RT(B)	A received data rate clock for use by an external data source.
Test Indicator	25	15	TM	ON during any test mode

Table B-7. RS-530 to X.21 pin allocation

B-7. RS-232/ALARM PORT CONNECTOR

The ***ETU02A-MUX*** RS-232/ALARM port (craft port) has a standard RS-232 DCE interface terminated in a 9-pin female D-type connector, wired in accordance with Table B-8.

Pin	RS-232 Function	Direction	Connected to Terminal		Alarm Relay function
			DB9	DB25	
1	Data Carrier Detect (DCD)	Output	1	8	
2	Receive Data (RD)	Output	2	3	
3	Transmit Data (TD)	Input	3	2	
4					Normally closed (NC)
5	Signal Ground		5	7	
6					Common contact (COM)
7	Request To Sent (RTS)	Input	7	4	
8	Clear To Sent (CTS)	Output	8	5	
9					Normally open (NO)

Table B-8 RS-232/ALARM port connector pin allocation

The alarm relay is activated during power loss or loss of signal on the Main or Sub E1.

This page left blank intentionally.

NOTES:

ETU02A-MUX TECHNICAL INQUIRY FORM

Attn : Technical Support Division

From Company: _____

Name: _____

Tel: ( ) _____

Fax:( ) _____

■ **MODEL: ETU02A-MUX/AC ☐ ETU02A-MUX/DC ☐**

■ **ACTIVITY: As attached in Parameter setting table**

■ **SYS CONFIGURATION:**

■ **Question:**

NOTES:

CTC Union Technologies Co., Ltd.

Far Eastern Vienna Building
(Neihu Technology Park)
8F, No. 60 ZhouZi St.
Neihu, Taipei, Taiwan
Phone:(886) 2.2659.1021 Fax:(886) 2.2799.1355
E-mail: info@ctcu.com http://www.ctcu.com